

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	:	10/567,006	Confirmation No. 9880
Applicant (s)	:	Cheng Li, et al.	
Filed	:	August 27, 2004	
TC/A.U.	:	3748	
Examiner	:	Nguyen, Tu Minh.	
Title	:	IMPROVED DIESEL EXHAUST FILTER	
Docket No.	:	61861A	
Customer No.	:	00109	

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

BRIEF FOR APPELLANT

A Notice of Appeal was filed on June 18, 2010.

This brief contains items under the following headings as required by 37  
C.F.R. § 41.37 and M.P.E.P. § 1205.02:

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#### REAL PARTY IN INTEREST

The Real Party in Interest in this Appeal is Dow Global Technologies Inc., a wholly owned subsidiary of The Dow Chemical Company.

#### RELATED APPEALS AND INTERFERENCES

At this time there are no related appeals or interferences.

#### STATUS OF CLAIMS

Claims 1-9 and 11-19 are pending. Claims 1-5, 8, 9, 12, 18, and 19 have been rejected. Claim 10 has been cancelled. Claims 6, 7, 11 and 13-17 have been withdrawn. The rejections of Claims 1-5, 8, 9, 12, 18, and 19 are being appealed.

#### STATUS OF AMENDMENTS

There are no amendments pending.

## SUMMARY OF CLAIMED SUBJECT MATTER

### *Independent Claim 1:*

Claim 1 is directed to a Diesel exhaust filter. The filter requires two distinct layers of catalyst within the porous filter wall. The filter wall is comprised of an acicular ceramic. There is a Diesel oxidation catalyst within the wall adjacent to the first side of the filter wall and in between this layer and the second side is a NOx absorbing layer. (Original Claim 8 and page 3, lines 12-21).

### *Dependent Claim 6:*

Dependent Claim 6 requires that the porous filter has a rigid acicular ceramic porous wall and large amounts of the NOx catalyst within the wall. Applicants have discovered improved performance. (Original Claim 2; page 7, lines 1 and 12; page 10, line 21; page 11, line 12 and paragraph bridging pages 6 and 7).

### *Independent Claim 8*

Independent Claim 8 is directed to a Diesel exhaust filter. The filter requires three distinct catalyst layers in and on the filter wall. The filter wall is an acicular ceramic. The filter has three distinct layers, a Diesel oxidation catalyst (DOC) layer, three-way catalyst (TWC) layer and NOx absorbent layer. The DOC is adjacent to the first side of the porous wall of the filter, the TWC is adjacent to the second side of the porous wall, and the NOx absorbent layer is between the aforementioned layers and at least a portion of the NOx layer is within the wall of the filter. (Figures 5 and 7; Page 7, lines 9-24; Page 8, lines 6-19 and original Claim 6).

### *Summary*

Thus, the invention in one instance (Claim 1) is a filter that has inside the acicular wall of the filter two distinct layers of catalysts in a particular orientation. Likewise in Claim 8, the filter wall is comprised of an acicular ceramic that, has at least a portion of catalyst within the wall and there with at least three distinct catalyst layers. Applicants, have discovered an improved Diesel filter, by using an acicular

ceramic with catalyst within the wall, or in the case of Claim 1, all of the catalyst within the wall. The improved performance may be due to the lack or substantial lessening of any pressure drop penalty due to a differing pressure drop phenomena arising from the use of an acicular ceramic filter.

#### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

(1) Whether any one of the Claims 1-5, 8, 9, 12, 18, and 19 are obvious under 35 U.S.C. §103(b).

#### ARGUMENT

*Obvious Rejection of Claims 1-5, 8, 9, 12, 18, and 19:*

Claims 1-5, 8, 9, 12, 18, and 19 have been rejected under 35 U.S.C. §103(a) as being obvious over Molinier et al., U.S. Pat. No. 7,189,375 (Molinier) in view of Moyer et al., U.S. Pat. No. 5,198,007 (Moyer).

*Independent Claim 8:*

The Final Rejection avers that Molinier describes three layers. In support of this the Office Action states:

Re claims 1 and 8 as shown Figures 3-4, Molinier et al. disclose an improved Diesel exhaust filter (10) comprising a rigid porous wall (12), the porous wall having a first side (inlet channel side) and a second side (outlet channel side), the filter having three layers, [t]he first layer being adjacent the first side of the rigid porous wall, the first layer comprising a Diesel oxidation catalyst (22), the third layer being adjacent the second side of the rigid porous wall, the third layer comprising a three way catalyst (a catalytic metal component of a NOx adsorber composition (24) is deposited on a washcoat (lines 29-31 of column 8)), the second layer (wall portion (12) and the washcoat) being between the first layer and third layer, the second layer comprising a nitrogen oxide adsorber (alkali metal or alkaline earth metal (line 65 of column 7 to line 6 of column 8)).

Applicants disagree. Molinier only teaches two catalyst layers. Applicants find no place in Molinier supporting the contention of three layers of catalyst. In particular, there is no support for such a contention in the cited sections of Molinier.

Applicants point out, at line 65 of column 7 to line 6 of column 8, Molinier states, “[i]n addition to the catalytic metal component, the porous support may be further loaded with one or more NO<sub>x</sub> trapping materials, such as alkali metals, alkaline earth metal, and mixtures . . . .” Applicants, conjecture that perhaps the Office Action is suggesting that the porous support is referring to the filter element 12. This sentence, however, upon inspection is referring to the “NO<sub>x</sub> adsorber composition 24 preferably comprises a washcoat comprising a porous support, a catalytic metal component and one or more trapping materials (such as alkali metals . . . .) disposed thereon.” (col. 7, lines 8-13) The porous support is described at col. 7, lines 17-21. The porous support, washcoat and alkali metals are merely a part of the NO<sub>x</sub> absorber composition and as such is not another layer.

Applicants also point out that Molinier describes that the NO<sub>x</sub> absorber composition and the soot oxidation catalyst may be disposed on the surface the filter elements 12 and/or impregnated into the filter elements 12 (col. 2, lines 17-20 and 29-31). From Figures 1, 3 and 4, the filter element is obviously, for example, a porous wall in a ceramic honeycomb filter. Thus, Molinier makes a clear distinction of catalyst disposed on the surface and catalyst within the filter element 12 (i.e., porous filter wall). This is not surprising, since Molinier is quite concerned about the thickness of the catalyst layers causing a substantial pressure drop (col. 4, lines 38-40 and col. 5, lines 18-21).

The only places where Molinier may actually describe layers is, col. 4, lines 26-40 and, second, col. 5, lines 9-17. In the first passage, a soot catalyst is disposed on the surface of the filter element that forms the inlet channel, with it being preferred that the NO<sub>x</sub> absorber composition being disposed on the surface of the filter element that forms the outlet channel. At this passage, Molinier also describes that the NO<sub>x</sub> absorber composition may also be disposed on the surface of the filter element that forms the inlet channel, but does not specifically describe discrete layers of the soot catalyst and NO<sub>x</sub> absorber composition on the surface of the filter element forming the inlet channel. Thus, from this passage, Molinier reasonably describes a layer of soot catalyst on the surface of the filter element that forms the inlet channel and a NO<sub>x</sub> absorber composition on the surface of the filter element forming the outlet channel.

The Examiner has failed to point to anywhere in Molinier where a third catalyst layer is described. Further, the Examiner has failed to point to anywhere in Molinier where the third layer is a TWC (three-way catalyst) layer. Consequently, since the Examiner has failed to point out each and every element of the Claim 8, the Examiner has failed to make out a *prima facie* case of obviousness and therefore, Claim 8 is non-obvious. The advisory action also fails in this regards as described below (Response to Advisory Action Arguments).

*Independent Claim 1:*

To summarize, amended Claim 1 requires that the soot catalyst and NOx absorber are layers that are in the porous wall of a filter and the porous wall is an acicular ceramic. As described above, Molinier fails to describe or suggest separate and distinct catalyst layers within the filter wall. This, from the reading of Molinier, can be attributed to the pressure drop problem recognized by Molinier described above, where the catalyst and NOx absorber compositions are preferred to be only disposed on the surface of the filter element, but even then the thickness of the layer has to be limited (e.g., col. 4, lines 26-39). In other words, if the pores of the filter element wall are filled with the catalyst, this would be akin to having a really thick catalyst layer on the surface of the filter element resulting in problematic pressure drop. Consequently, since amended Claim 1 requires that the catalyst layers are within the filter wall only in contradiction to the suggestion of Molinier, amended Claim 1 is non-obvious over Molinier in view Moyer (note, Moyer was merely cited to show that acicular mullite may be used as a filter).

Further, Molinier makes no distinction as to the usefulness of any particular material of the filter element. Molinier only describes a long list of suitable materials such as cordierite, silicon carbide and mullite (col. 6, line 67 and col. 7, lines 1-4). In contrast, amended Claim 1 requires the use of an acicular ceramic, none of which is described by Molinier. Surprisingly, the use of such acicular ceramics have been discovered to allow for the use of the catalyst in the walls with sufficient catalyst without the problem of pressure drop (see, for example, page 5, lines 25-31 and paragraph bridging pages 6 and 7 of the specification wherein the filter can have a large amount NOx absorber in the walls - 10% by volume -, which is much greater

than described by Molinier). This is surprising, since Molinier and Moyer fail to describe any difference the material of the filter wall has on performance of the filter (e.g., pressure drop) with a catalyst in the filter wall or even without a catalyst at all. In other words, they make no distinction between filter wall materials and certainly do not lead one to expect substantially improved performance by use of an acicular ceramic with catalyst layers in the wall. For this further reason, amended Claim 1 is nonobvious over Molinier in view Moyer.

*Dependent Claim 6:*

To summarize, amended Claim 6 requires that a filter in which the wall of the filter is an acicular ceramic and within the porous wall is a catalyst composition comprised of a NO<sub>x</sub> absorbent and a soot combustion catalyst, wherein the NO<sub>x</sub> absorbent is comprised of a barium salt, barium oxide or combination thereof and said NO<sub>x</sub> absorbent is present from 40 grams/liter to 570 grams/liter.

As described above, Molinier specifically describes that pressure drop in the filter is a problem. In particular, Molinier prefers that the catalysts are on the surface of the filter to mitigate this problem as described above. Molinier only describes catalyst loadings of at most about 0.031grams/cc (31 grams/liter) of a filter (col. 10, lines 58-60). Amended Claim 1, in contrast, requires that just the NO<sub>x</sub> absorbent is substantially greater than the amount of catalyst described by Molinier. This ability to put a great amount of catalyst/NO<sub>x</sub> absorbent within the porous filter wall is neither described nor suggested by Molinier or Moyer individually or in combination. Further Molinier makes no distinction in the filter element (i.e., porous filter wall) and as such, a filter with a high NO<sub>x</sub> absorbent loading within the porous acicular ceramic filter wall is unexpected. For this further reason, the rejection of Claim 6 should be withdrawn.

### Response to Advisory Action Arguments

The Examiner in Response to Arguments section of the Final Rejection, the Examiner quotes Molinier at lines 29-37 of col. 8, which reads:

*The catalytic metal component and trapping materials can then be deposited on or with the washcoat by any suitable manner, such as by impregnation techniques. For example, the catalytic metal component and trapping materials, individually or together, can be dissolved as soluble precursors (e.g., as a salt like potassium nitrate) in an aqueous or organic solvent, which is then impregnated into the porous support. Preferably, the catalytic metal components are impregnated prior to the trapping materials. (emphasis added by Examiner).*

This section was again cited in the Advisory Action. To reiterate, Applicants agree that Molinier teach impregnating a washcoat, and there may even be a layer of differing materials on or within a washcoat particle. This, however, does not lead to a layer of any sort within the wall or on the wall of the honeycomb filter. It merely, distributes such materials on the washcoat, in which the catalyst on the washcoat is evenly distributed on or within the walls of the honeycomb support. Washcoat is a term of the art meaning, for example, high surface area particulates of alumina and zeolite (see col. 7, lines 18-34). The particles (porous supports in Molinier) may be impregnated prior to or after being applied to the filter element. These particles are washcoated on or in the walls of a metal or ceramic honeycomb wherein the catalyst is applied on the washcoat particles (see, for example, U.S. Pat. No. 4,233,189 abstract). Thus, it is clear that Molinier does not describe discreet layers of differing catalyst on or within the honeycomb support walls.

In view of Applicants' remarks, the Examiner's rejections are believed to contain clear error. Accordingly, Applicants submit that the present application contains allowable subject matter and is in condition for allowance. Should the



Appeal Board or the Examiner have any question or wish to further discuss this application, Applicants request that the undersigned be contacted at (248) 391-6321.

If for some reason, Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this Appeal Brief and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 04-1512 for any fee which may be due.

Respectfully submitted,

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August 17, 2010

## CLAIMS APPENDIX

Claim 10 has been canceled.

Claims 6, 7, 11, and 13 have been withdrawn.

### Claims

1. (Previously Presented) An improved Diesel exhaust filter comprising a rigid porous wall that is comprised of an acicular ceramic, the porous wall having a first side and a second side, the porous wall having therein a Diesel oxidation catalyst layer and a NO<sub>x</sub> absorbent layer, wherein the Diesel oxidation catalyst layer is adjacent to the first side of the porous wall and the NO<sub>x</sub> absorbent layer is between the Diesel oxidation layer and second side of the porous wall.
2. (Previously Presented) The improved Diesel exhaust filter of Claim 1, wherein the NO<sub>x</sub> absorbent is comprised of a barium salt, barium oxide or combination thereof.
3. (Previously Presented) The improved Diesel exhaust filter of Claim 1, wherein the NO<sub>x</sub> absorbent is present from 40 grams/liter to 570 grams/liter of the filter.
4. (Previously Presented) The improved Diesel exhaust filter of Claim 1, wherein the acicular ceramic is comprised of acicular mullite.
5. (Previously Presented) The improved Diesel exhaust filter of Claim 3, further comprising a three way catalyst layer within the porous rigid wall, said third catalyst layer being between the second side and NO<sub>x</sub> absorbent layer.
6. (Withdrawn)
7. (Withdrawn)
8. (Previously Presented) An improved Diesel exhaust filter comprising a rigid porous wall that is comprised of an acicular ceramic, the porous wall having a first side and a second side, the filter having a Diesel oxidation catalyst layer, three way catalyst layer and a NO<sub>x</sub> absorbent

layer, wherein the Diesel oxidation catalyst layer is adjacent to the first side of the porous wall, the three way catalyst layer is adjacent to the second side of the porous wall and at least a portion of the NO<sub>x</sub> absorbent layer is in the porous wall between the Diesel oxidation layer and three way catalyst layer.

9. (Previously Presented) The improved Diesel exhaust filter of Claim 8, wherein the acicular ceramic is acicular mullite.
10. (Cancelled).
11. (Previously Presented) The improved Diesel exhaust filter of Claim 7, wherein the alumina particles are colloidal alumina particles.
12. (Withdrawn)
13. (Withdrawn)
14. (Withdrawn)
15. (Withdrawn)
16. (Withdrawn)
17. (Withdrawn)
18. (Previously Presented) The improved Diesel filter of Claim 8 wherein the NO<sub>x</sub> absorber is entirely within the porous filter wall.
19. (Previously Presented) The improved Diesel filter of Claim 18 wherein each of the catalyst layers are within the porous filter wall.

## EVIDENCE APPENDIX

There is no evidence to submit at this time.

**RELATED PROCEEDINGS APPENDIX**

None